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The genus *Chaerilus* Simon, 1877 (Scorpiones, Chaerilidae) in the Himalayas and description of a new species

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Abstract

A new species is described belonging to the genus *Chaerilus* Simon, 1877. *Chaerilus annapurna* **sp. n.** was discovered in the high plateaux of the Himalayas in Central-Western Nepal. For comparative purposes a precise re-diagnosis is proposed for *Chaerilus truncatus* Karsch, 1879, originally described from an imprecise locality in Himalaya. This species has recently been discussed by several authors: nevertheless, it has sometimes been the subject of misidentification.

Keywords

Scorpion, Chaerilidae, *Chaerilus*, new species, Himalayas, Nepal

Introduction

The family Chaerilidae with its single genus *Chaerilus* remains among the least known taxa of extant scorpions. In the Catalog of Scorpions of the World (Fet 2000), 21 species have been listed in the genus *Chaerilus* Simon, 1877. In a very approximate revision of the genus, Kovařík (2000) defined 18 species as valid. He

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subsequently added two new species (Kovařík 2005). More recently, other new species from China, Indonesia, Laos, the Philippines and Vietnam have been described (Qi et al. 2005; Lourenço and Zhu, 2008; Lourenço and Ythier, 2008; Zhu et al. 2008; Lourenço 2009). A precise historical account of the group can be found in Lourenço and Zhu (2008).

The family Chaerilidae is distributed only in the Oriental Region, mainly in South and Southeast Asia. It was suggested (Lamoral 1980) that the ancestors of the chaerilids originated in Pangaean times as an eastern Laurasian relic that moved into the Oriental Region after the Indian plate become connected with Laurasia. The group became isolated in the Oriental Region as the Himalayas were raised up.

Although the type species of the genus, *Chaerilus variegatus* was described by Simon (1877) from Java, several species have subsequently been described from the Himalayas and nearby regions. The species from India, Nepal, Bangladesh and China, have proved to be extremely uniform in their morphology, and most were defined on the basis of weak diagnostic characters. The main reason for this comes from the fact that specimens are globally rare and poorly represented in collections. In several cases, species are represented by only one of the sexes or by juveniles of both sexes. Type material is frequently old and poorly preserved. This lead Kovařík (2000) to place several of the old Himalayan species in synonymy with *Chaerilus truncatus* Karsch, 1879, the first to be described. Although the revision by Kovařík (2000) is rather poor, we concluded that these synonymies should be confirmed with the aid of the available samples we had. It is quite possible that several old Himalayan species have been diagnosed on the basis of intra-specific variability. One exception is *Chaerilus pictus* (Pocock 1890) from Bangladesh which presents very marked sexual dimorphism in the shape of the telson. As a result, *Chaerilus truncatus* now appears to have a widespread distribution in the Himalayas. Even so, this rather 'common species', discussed by several authors, has also been the subject of subsequent misidentifications. In many cases, females have been identified as males. Our conclusion is that males have never been clearly described. At present, a precise re-diagnosis is proposed for *Chaerilus truncatus* and a new associated species is described from Central Western Nepal.

Methods

Illustrations and measurements were made with the aid of a Wild M5 stereo-microscope with a drawing tube (camera lucida) and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Hjelle (1990).

Taxonomic treatment

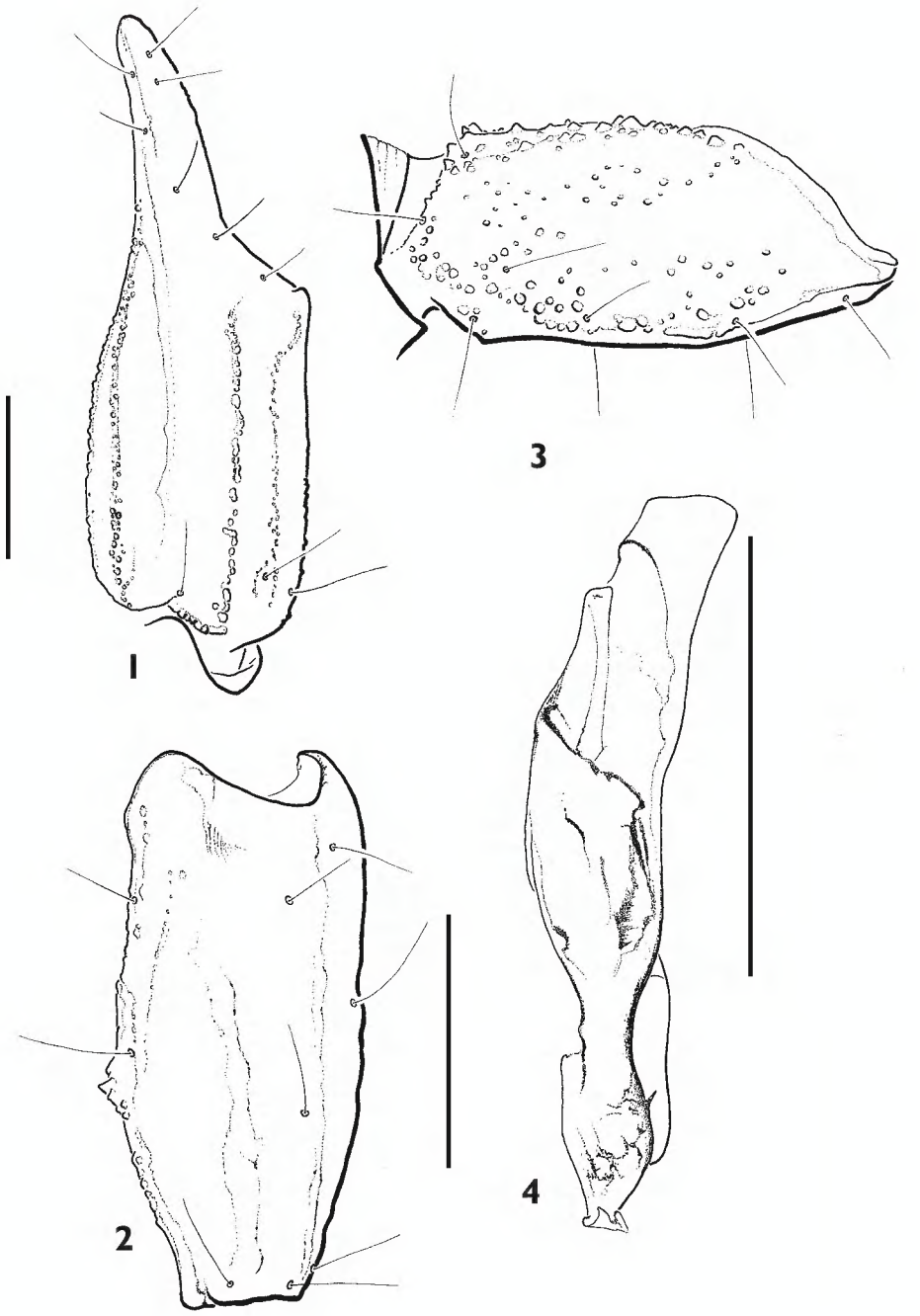
Chaerilidae Pocock, 1893
Chaerilus Simon, 1877

Chaerilus truncatus Karsch, 1879
Figs 1–11

Revised diagnosis. Scorpions of moderate to large size in relation to the other species of the genus, with a total length of 41 to 45 mm for males and 52 to 66 for females. General coloration reddish-yellow to reddish-brown with granulations and carinae somewhat more blackish on metasomal segments and pedipalps. This pattern of pigmentation proves to be invariably in preserved males, females and juveniles.

Anterior margin of carapace with a minute concavity in males; tegument smooth; straight and moderately granular in females; presence of two longitudinal carinae in both sexes; furrows moderately deep; two pairs of lateral eyes; one pair of small median eyes, about 1.5 times the size of lateral eyes; median eyes only slightly anterior to the centre of the carapace. Tergites smooth in males, intensely granulated in females; carinae obsolete. Sternum pentagonal, longer than wide; genital operculum plates with a sub-triangular shape. Pectinal tooth count 5–6 in males, 4–4 in females. Sternites smooth with spiracles small and oval-shaped; only VII weakly granulated in females. Metasoma: Carinae weakly granular in males, better marked in females; ventral carinae reduced or absent on segment I. Vesicle elongated with a pear-like shape in both sexes, smooth, with a short aculeus. Pedipalps slightly narrower in males; carinae well marked in both sexes; granulations more intensely marked in females. Fixed and movable fingers shorter than manus in both sexes with 9(10)–10(11) rows of granules on the dentate margins. Chelicerae characteristic of the family Chaerilidae (Vachon 1963). Trichobothriotaxy of type B; orthobothriotaxic (Vachon 1974); femur with 9 trichobothria, patella with 14, and chela with 14. Legs with pedal spurs moderately developed. Tarsi with two rows of spiniform setae. Hemispermatophore of Fusiform Type, with the distal lamina short and straight.

Material used for the diagnosis. India, Himalaya-Koollao, 1 female, MNHN-RS-0605; Himalaya-Dehra-Dun, 3 males, MNHN-RS-0606; W. Himalaya-Katta (Kalta) Pani, 1 male, MNHN-RS-0598; W. Himalaya-Kalta Pani, 1 male; Himachal Pradesh, 2010 m, between McLeod & Dharamk ot, near Dharamsala, under wet stone in forest, 13.VIII.1977 (A. Dubois & D. Payen), 1 female, MNHN-RS-8337; Himachal Pradesh, by Lake Dal, near to Dharamsala, 1850 m, under wet stones 11.VIII.1977 (A. Dubois & D. Payen), 3 males, 1 female, MNHN-RS-8338. Nepal, W. Kathmandu, 1400 m, Station n°6, 13/IX/1969 (J. Martens), 2 males juveniles; Naudara-Grates, W. Pokhara, 1200 m, Station n°3, 17.III.1970 (J. Martens), 1 male, 2 females juveniles (JM Collection).



Figures 1–4. *Chaerilus truncatus*, male from India. **1–3** Trichobothrial pattern. **1** Chela, dorso-external aspect. **2–3** Patella and Femur dorsal aspect **4** Hemispermatophore, external aspect (scales = 3 mm).

***Chaerilus annapurna* sp. n.**
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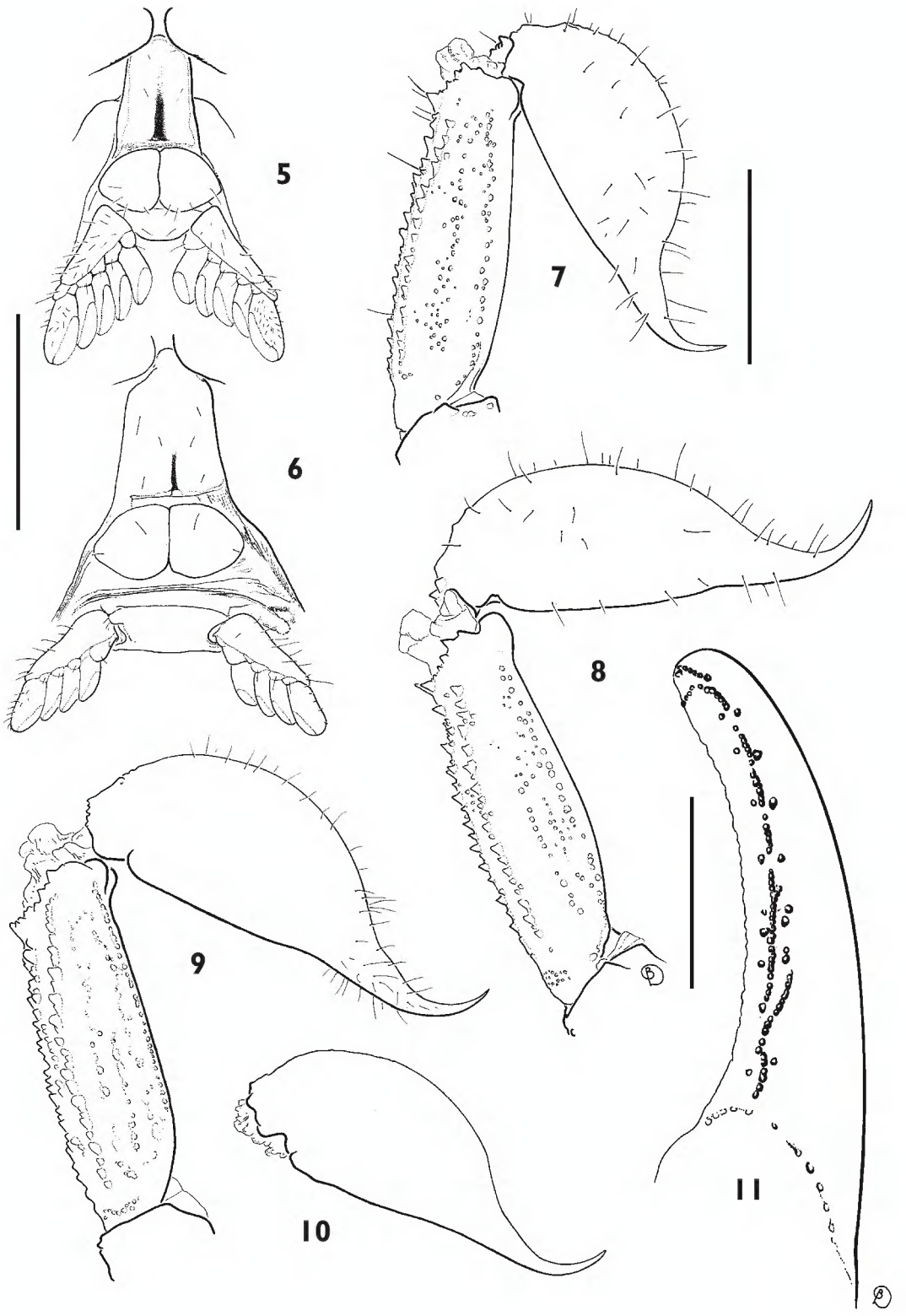
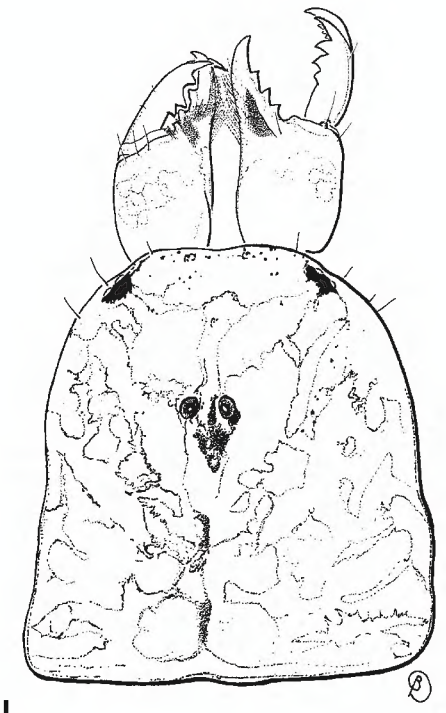
Figs 12–29

Diagnosis. Species of moderate size in relation to that of the other species in the genus, 49 to 55 mm in total length. General coloration reddish-yellow, marked intensely with variegated brownish spots. The exocuticular pigmentation becomes darker with age and finally turns blackish. This phenomen has already been observed in several other groups of scorpions (Lourenço and Cloudsley-Thompson 1996). However, in the present case, it was also observed among juveniles. This would suggest that intermolt periods are rather long. Carapace moderately narrowed toward the anterior edge; better marked in females; acarinate and smooth in males; moderately granulated in females; anterior margin straight; furrows shallow in males, moderately deep in females.



Figures 5–11. *Chaerilus truncatus* from India. **5–6** Sternum, genital operculum and pectines, male and female **7–8** Metasomal segment V and telson, lateral aspect, male and female. **9–11** *Chaerilus anthracinus* Pocock (= *C. truncatus*), male lectotype and female paralectotype. **9–10** Metasomal segment and telson, lateral aspect, male and female **11** Cutting edge of movable finger with rows of granules, male (scales = 3 mm).

Metasomal carinae moderately marked in males; strongly marked in females; ventral carinae obsolete on segment I, weakly marked on segment II; latero-ventral and ventral carinae on segments IV–V composed of strong spinoid granules; other carinae with moderately marked spinoid granules. Telson with an elongated pear-like shape; dorsal surface strongly depressed in males, only slightly in females. Male pedipalps strongly elongated in comparison with female pedipalps; chela fingers strongly granulated in males, in particular on the ventral surface of movable finger; dentate margins of fixed



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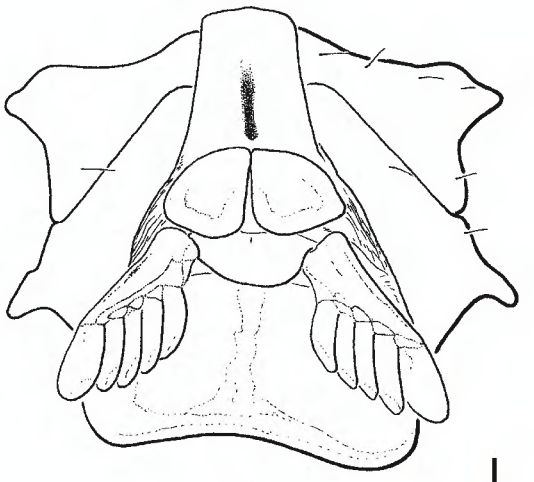

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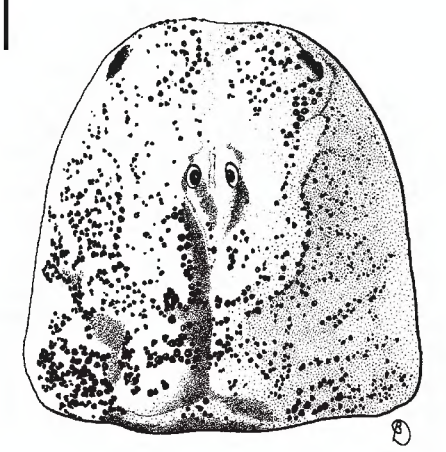

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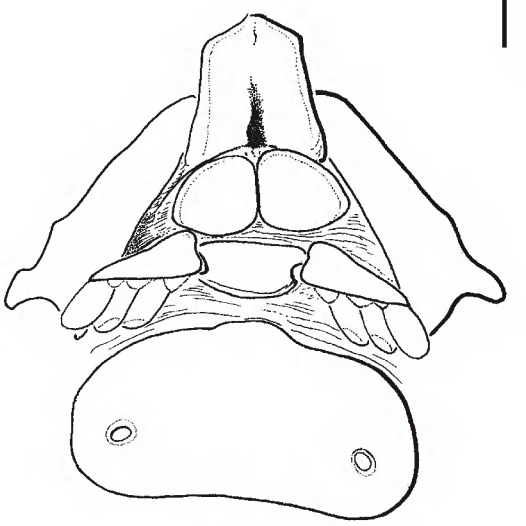

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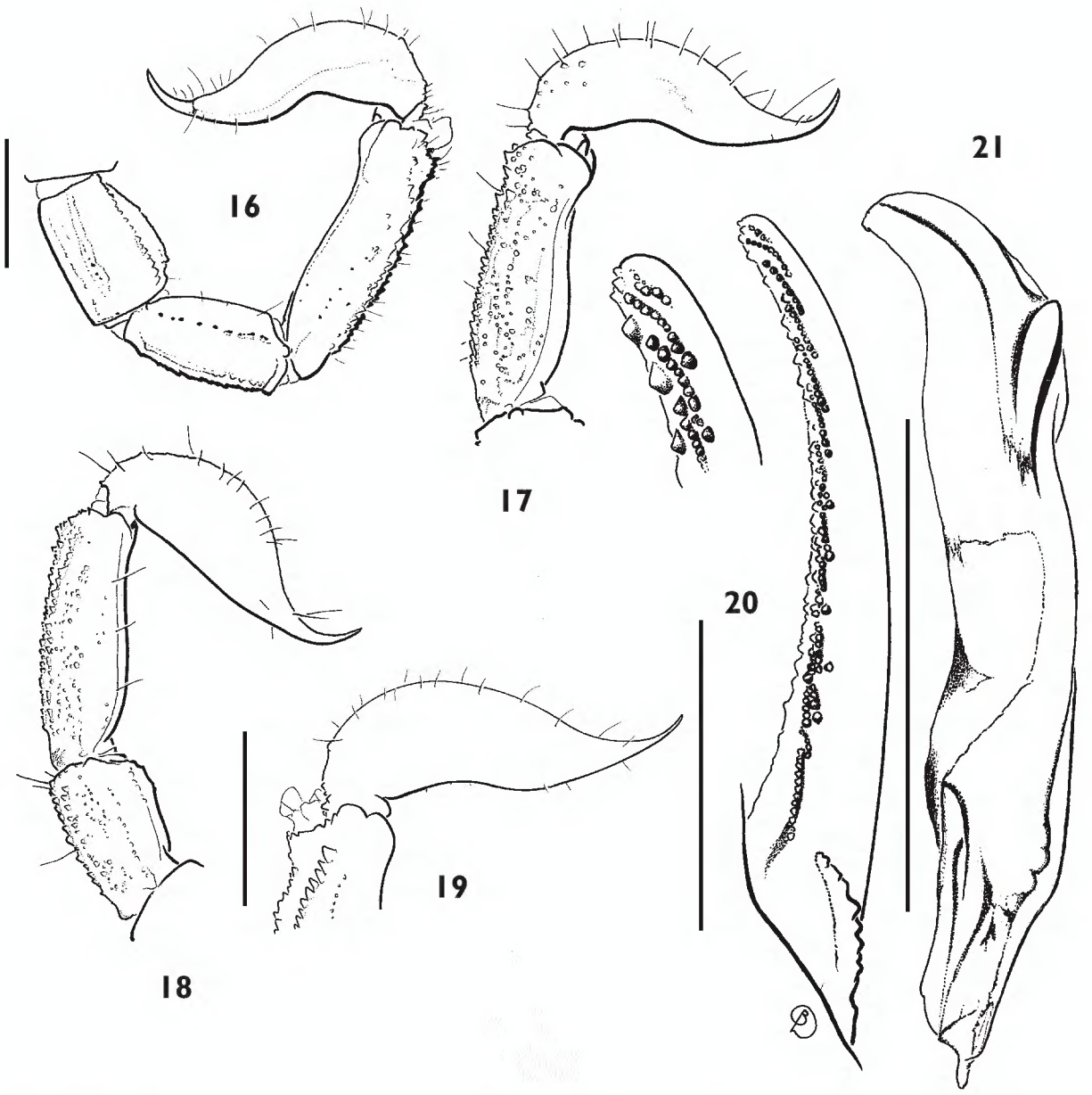
Figures 12–15. *Chaerilus annapurna* sp. n. **12–13** Carapace, dorsal aspect, male holotype and female paratype **14–15** Sternum, genital operculum, pectines and sternite 3. Idem 12–13 (scales = 3 mm).

and movable fingers with 10–12 (11–13) rows of granules. Pectinal tooth count 4–5 in males, 3–4 in females. Genital operculum plates have a sub-oval shape. Trichobothriotaxy of type B, orthobothriotaxic. Hemispermatophore of fusiform type, with the distal lamina short and curved on its distal portion.

Etymology. The specific name is placed in apposition to the generic name, and refers to the Annapurna Mountain, in the vicinity of which the new species was found, and seems to be endemic.

Material. Nepal, Region of Naudanda, N. of Lakhne, Kaski Gandaki, 2150 m, under large flat stones, 26/V/1996 (H. Tillak), 1 male holotype; Rice fields, 1450 m, under large flat stones, VI/1997 (H. Tillak), 1 male (pre-adult) paratype; 1350–1450 m, under large flat stones, VIII/1999 (H. Tillak), 1 male, 1 female paratypes. NW. of Gorkha, 2000 m, 25/VIII/1980 (B. Lasale), 1 male (juvenile) paratype. Pokkara, 1100 m, station n°4, 31/VII/1970 (J. Martens), 1 female (juvenile), paratype. Holotype and

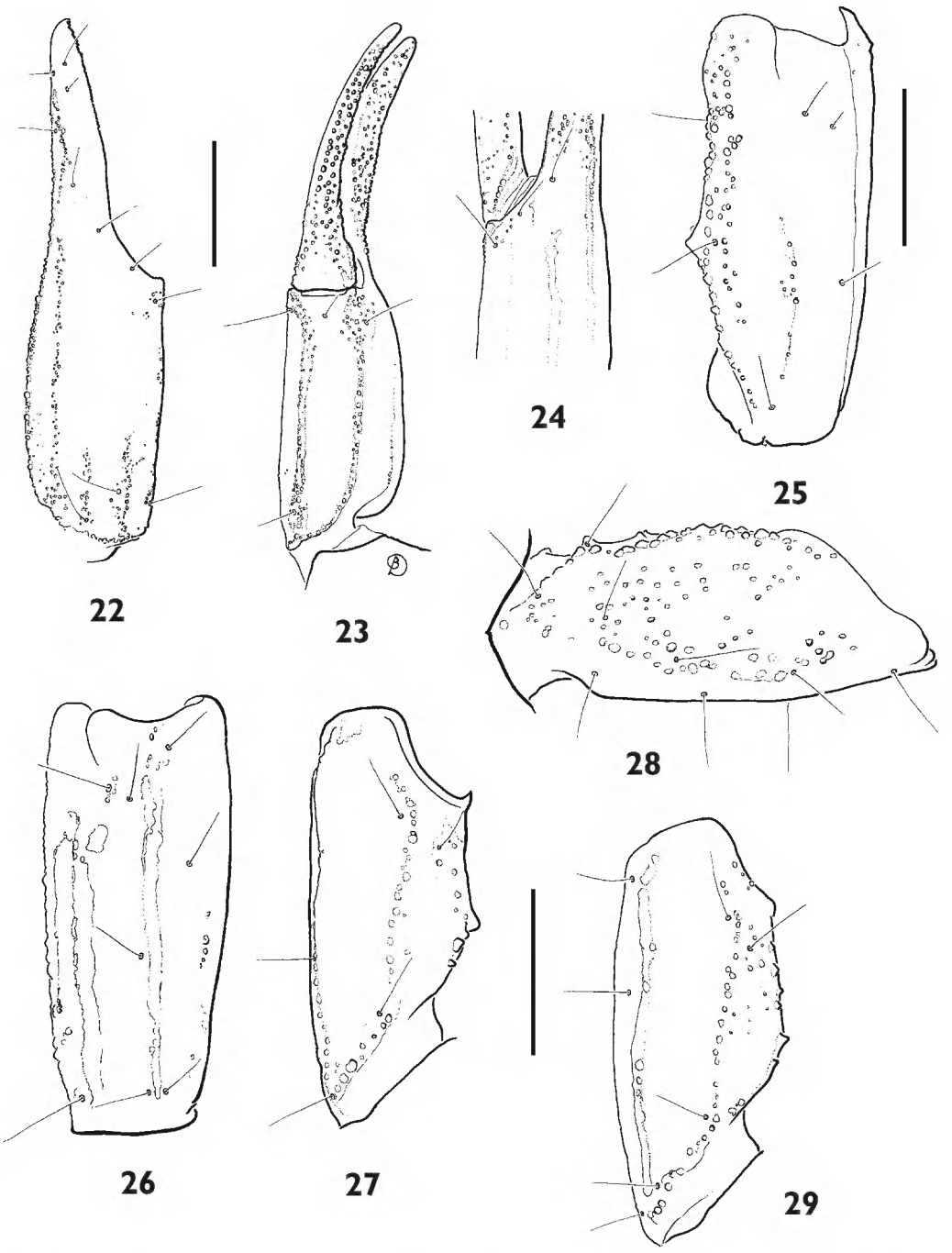


Figures 16–21. *Chaerilus annapurna* sp. n. **16–19** Metasomal segments and telson, lateral aspect. **16–17** Male holotype and male (juvenile) paratype **18–19** Female paratype and female (juvenile) paratype **20–21** Cutting edge of movable finger with rows of granules (extremity in detail) and hemispermatophore, male holotype (scales = 3 mm).

paratypes deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). Female paratype from Pokkara deposited in the collection of J. Martens.

Description. Coloration: Basically reddish-brown, intensely marked with variegated brownish spots, before tegumental sclerification (see diagnosis). Carapace reddish-yellow. Tergites of the same colour as carapace; both with variegated spots. Metasomal segments yellowish to reddish-yellow; carinae reddish. Telson yellowish; tip of aculeus reddish. Chelicerae yellowish with diffused variegated spots; fingers and teeth reddish. Pedipalps reddish; chela fingers with the carinae dark to blackish; dentate margins of fingers almost blackish. Legs reddish-yellow with diffused brownish spots. Venter and sternites yellowish; pectines pale yellow. Once tegumental sclerification has taken place general appearance is blackish and only pectines remain pale yellow.

Morphology: Carapace moderately narrowed anteriorly in males, more strongly marked in females; anterior margin straight, almost acarinate; smooth in males, moderately granulated in females; furrows shallow in males, moderately deep in females. Two



Figures 22–29. *Chaerilus annapurna* sp. n. Trichobothrial pattern. **22–24** Chela, dorso-external, ventral and internal aspects **25–27** Patella, dorsal, external and ventral aspects, male holotype **28–29** Femur, dorsal aspect and patella ventral aspect, female paratype (scales = 3 mm).

pairs of lateral eyes, and one pair of moderate median eyes, about 1.5 times the size of lateral eyes; median eyes anterior to the centre of the carapace. Tergites smooth in males with moderately marked granulations females; carinae obsolete in both sexes. Sternum pentagonal, longer than wide; genital operculum plates with sub-oval shape. Pectinal tooth count 5–5 in male holotype, 3–3 in female paratype. Sternites smooth with spiracles small and oval-shaped; carinae absent from VII. Metasoma: Segments I and II wider than long; segments III to V longer than wide. All the carinae moderately to strongly granular; ventral carinae obsolete on I, weakly marked on II; segments IV and V with latero-ventral and ventral carinae composed of strong spinoid granules. Vesicle very elongated with a pear-like shape, smooth; strongly dorsally depressed in males, only weakly depressed in females; aculeus moderately short. Pedipalps strongly elongated in males in comparison with females; femur with five carinae; internal with spinoid granules. Patella with seven carinae;

dorso-external weakly granular; dorso and basal-internal with spinoid granules. Chela with eight carinae, moderately to strongly granular; ventral median carinae moderate. Tegument moderately granular. Fixed and movable fingers longer than manus, strongly granular with 10–12(11–13) rows of granulations on the dentate margins. Chelicerae characteristic of the family Chaerilidae (Vachon 1963). Trichobothriotaxy of type B; orthobothriotaxic (Vachon 1974); femur with 9 trichobothria, patella with 14, and chela with 14. Legs with pedal spurs strongly developed. Tarsi with two rows of spiniform setae. Hemispermatophore of Fusiform Type, with the distal lamina short and curved on its distal portion.

Relationships

Chaerilus annapurna sp. n., shows morphological similarities with *Chaerilus truncatus* Karsch, 1879, also described from the Himalayas. The new species can, however, be readily distinguished by the following features: (i) the shape and structure of the telson, strongly depressed dorsally in males, (ii) male pedipalps much more elongated than female pedipalps (see Table I), (iii) movable finger of chela with very strongly marked granulation.

Conclusions

Although this study is only preliminary, some insights have been gained concerning the species of *Chaerilus* found in the Himalayas and nearby regions of India and Tibet.

Chaerilus truncatus is undoubtedly a rather common species, presenting intra-specific variations that led to the description of several 'closely associated' species. Consequently we agree with the decisions of previous authors (Kraepelin 1899; Kovařík 2000) who placed several of these species in synonymy of *C. truncatus*.

Chaerilus insignis Pocock, 1894, remains poorly characterized. Very few specimens are known and the type specimen, originally stored dry, is poorly preserved. The study of more material may show that this species is also conspecific with *C. truncatus*.

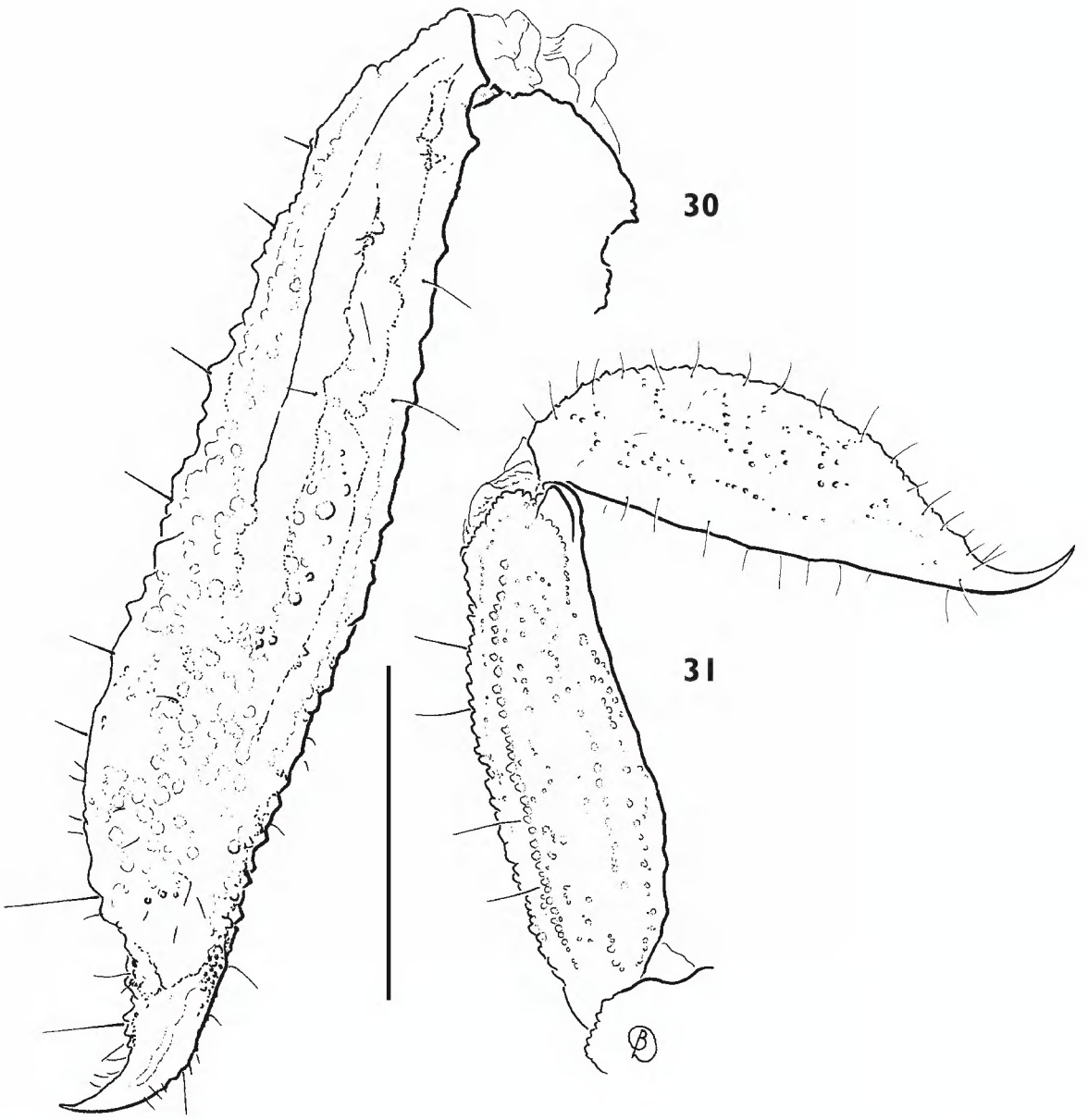
Chaerilus assamensis Kraepelin, 1913, described from Assam in India, remains poorly known. The type specimen is housed in NZSI, Calcutta, India, and its study by foreign experts is not possible. The recently described *Chaerilus tryznai* Kovařík, 2000 from China (Tibet), presents few differences from the species described by Kraepelin and may prove to be conspecific. Although Zhu et al. (2008) recently redescribed and properly illustrated *C. tryznai*, without the study of the type of *C. assamensis* a final decision cannot be taken in relation to these two species.

Chaerilus pictus (Pocock, 1890) is one of the most peculiar species in the genus (Figs 30–31). *Chaerilus gemmifer* Pocock, 1894, is unquestionably a synonym of *C. pictus*, as already suggested on several museum labels (by Kraepelin and Simon; results not published) for the material deposited in Hamburg and Paris. Kovařík (2000) confirmed this synonymy.

Table 1. Morphometric values (in mm) of *Chaerilus truncatus*, male and female from India and *Chaerilus annapurna* sp. n., male holotype and female paratype.

	C. truncatus		*C. annapurna* sp. n.	
	♂	♀	♂	♀
Total length*	41.2	51.8	53.1	49.1
Carapace:				
- length	6.7	7.5	8.2	7.6
- anterior width	3.3	4.0	4.5	4.2
- posterior width	6.5	8.1	8.2	7.6
Metasomal segment I:				
- length	2.0	2.5	3.3	2.5
- width	3.5	3.9	4.2	3.9
Metasomal segment II:				
- length	2.8	3.3	3.8	3.0
- width	3.0	3.5	3.7	3.2
Metasomal segment III:				
- length	3.0	3.6	4.1	3.2
- width	2.9	3.2	3.5	3.0
Metasomal segment IV:				
- length	3.4	4.0	4.5	3.5
- width	2.7	2.9	3.3	2.7
Metasomal segment V:				
- length	6.0	7.2	7.4	6.1
- width	2.4	2.6	2.8	2.5
- depth	2.0	2.5	2.4	2.1
Vesicle:				
- width	2.6	2.8	2.8	2.4
- depth	2.5	2.7	1.8	2.1
Pedipalp:				
- Femur length	6.2	6.2	8.2	5.9
- Femur width	2.8	3.0	3.4	2.6
- Patella length	6.6	6.6	8.0	6.0
- Patella width	2.7	3.1	3.2	2.6
- Chela length	12.7	12.8	15.6	12.0
- Chela width	3.4	4.3	3.5	3.6
- Chela depth	4.4	5.0	3.8	3.9
Movable finger:				
- length	6.3	6.7	8.1	6.7

*Including telson



Figures 30–31. *Chaerilus pictus* from India. Metasomal segment V and telson. **30** Male **31** Female (scales = 3 mm).

In conclusion, in the present state of our knowledge, only the following species can be retained as valid for the Himalayas and nearby regions:

Chaerilus truncatus Karsch, 1879
Chaerilus pictus (Pocock, 1890)
Chaerilus assamensis Kraepelin, 1913
Chaerilus tessellates Qi, Zhu & Lourenço, 2005
Chaerilus conchiformus Zhu, Hav & Lourenço, 2008
Chaerilus annapurna sp. n.

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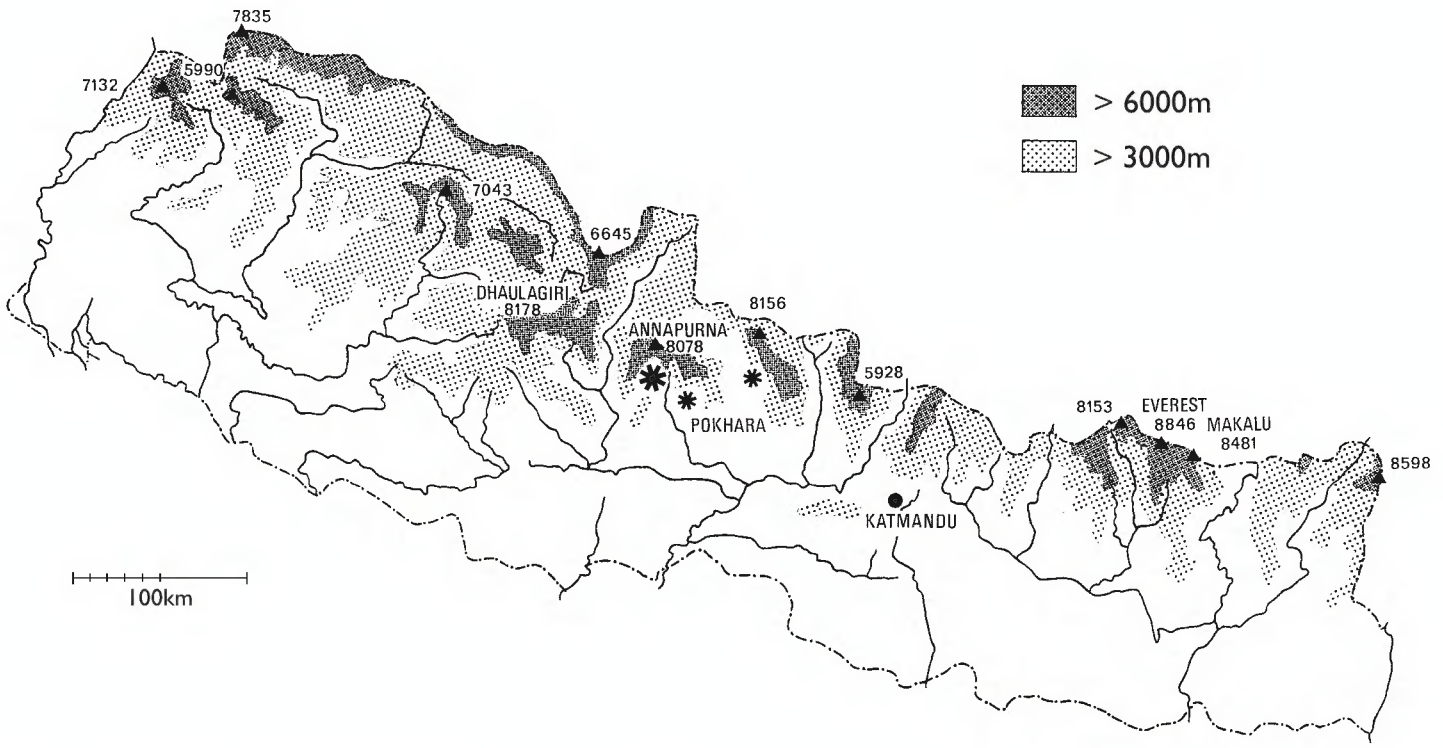

Figure 32. Map of Nepal showing the type locality of the new species (black asterisk). The largest asterisk indicates the site where the holotype was collected.

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